1.5 Concept Generation

Concept generation is useful in the process of formulating and devising several solutions to solve the project objective. Multiple generation tools were utilized to create 100 design concepts to achieve the project goal.

Concept Generation Tools

Various techniques were utilized during the concept generation process to assist in reaching 100 design concepts. Among these techniques are the morphological chart, brainstorming, and biomimicry. Changes were made to strongly favor concepts along the generation process to better differentiate concepts as well as add other concepts.

Medium Fidelity Concepts

After reaching 100 concept ideas through the concept generation process, five concepts were chosen as medium fidelity concepts. These five concepts were chosen as medium fidelity concepts due to features that they include fitting for the project objective. Although these medium fidelity concepts are not being considered for upper-level prototyping, they are useful for creating certain design characteristics that are desirable in the eyes of the solution for the project. The medium fidelity concepts are shown below.

Table 8: Medium Fidelity Concepts

Concept Number	Concept Description
47	Omnidirectional ROS2 MBPC + PID Regenerative
50	Omnidirectional ROS2

	SBMPO Regenerative
83	Modifying the frame of the vehicle for decreased drag
84	High roll centers (Suspension Design)
86	Completely even weight distribution

High Fidelity Concepts

From the 100 generated concepts three were chosen to be high fidelity concepts. For the high-fidelity concepts, the best and most desirable design characteristics and functions were chosen and combined to reach the best possible solutions for the project. The high-fidelity concepts are shown below.

Table 9: High Fidelity Concepts

Concept Number	Concept Description
28	Ackermann ROS2 MBPC + PID Resistive
29	Ackermann ROS2 MBPC + PID Regenerative
32	Ackermann ROS2 SBMPO Regenerative